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10/584,639	06/26/2006	Woo-Yong Lee	123054-06079419	5027

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EXAMINER	
DOAN, PHUOC HUU	

ART UNIT	PAPER NUMBER
2617	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/584,639	LEE ET AL.	
	Examiner	Art Unit	
	PHUOC H. DOAN	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,22 and 23* is/are rejected.

7)☒ Claim(s) *6-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/28/06; 06/26/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo (US Patent No: 6,345,036) in view of Jalali (US Pub No: 2003/0095506).

As to claim 1, Sudo discloses an adaptive resource allocation method in a multi-channel communication system (col. 3, lines 57-65 "OFDM transmitting and receiving apparatus with one channel are converted to signals of four channels", comprising: a) allocating a number of bits to be transmitted according to a sub-channel quality (col. 10, lines 34-40 "combining the bit shift circuits and controller based on reception power of each sub-carrier whereby making it possible to perform precise transmission power control"); b) determining a minimum power for a total transmission rate (col. 7, lines 36-44 "value from the average value is multiplied by the coefficient"). However, Sudo does not disclose c) determining a channel gain for the subchannel according to the allocated number of bits and the

power ; and d) determining a modulation method for each subchannel based on the channel gain.

In the same filed of endeavor, Jalali discloses c) determining a channel gain for the subchannel according to the allocated number of bits and the power (page 4, par. [0053] "subchannels is also referred to as bit loading to provide the estimate of the SNr for the equivalent AWGN channel"); and d) determining a modulation method for each subchannel based on the channel gain (page 5, par. [0071] "at step 218 and associate with the threshold SNR sub th rate is a function of the modulation scheme"). Therefor, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a channel gain for the subchannel according to the allocated number of bits and the power, and a modulation method for each subchannel based on the channel gain as taught by Jalali to the system of Sudo in order to **effectively** code and modulate data for transmission in an OFDM system.

As to claim 2, Jalali further discloses the adaptive resource allocation method of claim 1, wherein, in a), a Lagrange multiplier .lamda. is analytically and experimentally estimated to allocate the number of bits (page 4, par. [0054-0058] "an Eq (6) which multiplier lamda defined based on the subchannel with over all

frequency subchannel to provide the estimate of the SNR in combination of the function f(x) as the theoretical maximum data rate is defined based on the constrained channel capacity function on the Eq (6)").

As to claim 3, Jalali further discloses the adaptive resource allocation method of claim 1, further comprising: in d), adaptively performing a convex search in the recursive manner according to the average power and transmission rate (page 4, par. [0045-0048] "the parameters H(k) and N sub 0 map to the power of noise ratio. If the total transmitt power, for the system is fixed and the allocation of the transmit power to N sub F then express in Eq (4)"); and determining a final modulation method of the subchannels based on the searched convex (page 5, par. [0067-0068] "based on the evaluated for the specific modulation scheme").

As to claim 4, Jalali further discloses the adaptive resource allocation method of claim 3, wherein a relation between the average power and the transmission rate is represented as P(R)=.sigma..sup.2.alpha..sup.-R and R>0 with reference to a given channel response and a modulator, where P(R) denotes an average power-transmission rate function, .sigma..sup.2 denotes a variance of radio wave signals, and a is greater than 1 (See page 3 through page 4, par. [0043-0054] "which

defined noise variance of N sub o using modulation scheme M(k) which is an estimate of the power transmission rate function based on an equivalent data rate of D sub equiv to achieve the desired PER of P sub e that supported by the OFDM system for the given multipath channel. The N sub r data rates may be ordered such that D(0) < D(1) < D(2)").

As to claim 5, Jalali further discloses the adaptive resource allocation method of claim 3, wherein the convex search process for searching an optimal solution .lamda.* for the given transmission rate R.sub.t comprises: a) respectively initializing a supremum .lamda..sub.l and an infimum .lamda..sub.u of the object transmission rate to be 0 and .infin. (page 3, par. [0040-0041] "where r is an index for the data rates, r = 0, 1, …, N sub R -1 and the N sub R data rates D(o)<D(1)<D(2)…<D(N sub R – 1"); b) experimentally selecting an initial Lagrange multiplier estimate of .lamda. for the object transmission rate R.sub.t (page 4, par. [0045-0048]) "required on the AWGN channel to achieve the desired PER OF P sub e using the coding and modulation schemes associated with the data rate"); c) solving a transmission rate non-constraint problem until a Lagrange multiplier .lamda. corresponding to the object transmission rate R.sub.t is found; d) searching for a lowest transmission rate R.sub.l and a highest transmission rate

R.sub.h (page 4, par. [0049-0056] "determined the SNR needed in the AWGN channel in combined with the equivalent data rate D sub equiv using the modulation scheme M based on the estimate from low to high power or data rates); and e) returning to solving the transmission rate non-constraint problem (page 5, par. [0071-0074] "evaluates the available data rates, one at a time, from the maximum available data rate to the minimum available data rate to ensure that the desired PER can be achieved").

As to claim 22, Sudo discloses an adaptive resource allocation processor in an orthogonal frequency division multiplexing system comprising (col. 3, lines 57-65 "OFDM transmitting and receiving apparatus with one channel are converted to signals of four channels": a channel estimator for estimating a channel quality; an adaptive subchannel allocator for determining a channel gain for a subchannel based on the estimated channel value (col. 10, lines 34-40 "controller based on reception power of each sub-carrier whereby making it possible to perform precise transmission power control"). However, Sudo does not disclose that allocating bits and power for the subchannel based on the channel gain; and an adaptive bit loader for outputting a bit table and a power table according to the allocated bits and power.

In the same filed of endeavor, Jalali discloses that allocating bits and power for the subchannel based on the channel gain (page 4, par. [0053] "subchannels is also referred to as bit loading to provide the estimate of the SNr for the equivalent AWGN channel"); and an adaptive bit loader for outputting a bit table and a power table according to the allocated bits and power (page 4, par. [0045-0048], page 5, par. [0071-0074]) "required on the AWGN channel to achieve the desired PER OF P sub e using the coding and modulation schemes associated with the data rate. The evaluates the available data rates, one at a time, from the maximum available data rate to the minimum available data rate to ensure that the desired PER can be achieved"). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide that allocating bits and power for the subchannel based on the channel gain and an adaptive bit loader as taught by Jalali to the system of Sudo in order to **effectively** code and modulate data for transmission in an OFDM system.

As to claim23, Jalali further discloses the adaptive resource allocation processor of claim 22, further comprising a symbol mapper and a symbol demapper for respectively mapping and demapping bits and power of symbols according to the bit table and the power table (page 3, par. [0040-0044] "where r is an index for the

data rates, r = 0, 1, …, N sub R -1 and the N sub R data rates

D(o)<D(1)<D(2)…<D(N sub R – 1") .

Allowable Subject Matter

3. Claims 6-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to claim 6, the prior art of record does not disclose wherein the initial Lagrange Multiplier value of .lamda. satisfies .lamda. = - .differential. P .function. (R) .differential. R = .alpha. - R .times. .sigma. 2 .times. ln .times. .times. .alpha. .

As to claim 10, the prior art of record does not disclose wherein, in c) for solving the transmission rate non-constraint problem, a less Lagrange multiplier .lamda. is selected for the purpose of having a solution representing a higher transmission rate in a next step when a transmission rate for a predetermined solution or a highest transmission rate for a plurality of solutions is less than the object transmission rate R.sub.t, which is repeatedly performed until the Lagrange multiplier .lamda. corresponding to the object transmission rate R.sub.t is found.

Dependent claims are objected by the virtue dependency in claim 6, and 10.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ohsuge (US Patent No: 6,768,729) discloses "CDMA receiver, path detection method, and recording medium on which path detection control, program is recored".

Wesel (US Patent No: 6,125,150) discloses "Transmission system using code designed for transmission with periodic interleaving".

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHUOC H. DOAN whose telephone number is 571-272-7920. The examiner can normally be reached on 9:30 AM - 6:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, VINCENT HARPER can be reached on 571-272-7605. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/VINCENT P. HARPER/
Supervisory Patent Examiner, Art Unit 2617

/PHUOC DOAN/
05/06/08